APRIL/MAY 2023

DPH32 — NUCLEAR PHYSICS

Time : Three hours　　　　Maximum : 75 marks

LIBRARY

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define scattering length.
2. What are exchange forces?
3. State conservation laws for nuclear reactions.
4. Write down the selection rules for alpha decay.
5. List out the applications of liquid drop model.
6. What do you mean by nuclear isomerism?
7. Write down any four instruments that are used in detecting the nuclear radiations.
8. Give the significance of Rutherford back scattering spectrometer.
9. How elementary particles can be classified?
10. What is meant by parity?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain in detail about the Meson theory of nuclear forces.

Or

(b) Give an account of proton neutron scattering at low energies.

12. (a) Discuss in detail about the Fermi's theory of beta decay.

Or

(b) Describe in detail about Gamow's theory of alpha decay.

13. (a) Explain in detail about Bohr–Wheeler theory.

Or

(b) Discuss the failures of shell model.

14. (a) Explain the working of cyclotron.

Or

(b) Write a short note on neutron activation analysis.

15. (a) Classify fundamental forces and elementary particles.

Or

(b) Deduce Gell–Mann Okubo mass formula for decaplet.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write a short note on deuteron. Derive magnetic dipole moment of deuteron.

17. Derive Breit – Wigner single level formula.

18. Explain in detail about collective model.

19. Describe in detail about the construction and working of Geiger – Muller counter.

20. Derive Gell – Mann Nishijima relation.
